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SH-203P-1/AFC (250 to 500 MHz)

PLUG-IN TUNING HEAD

INSTRUCTION MANUAL

ASTRO COMMUNICATION LABORATORY
9125 Gaither Road
Gaithersburg, Maryland

SH-203P-1/AFC (250 to 500 MHz)

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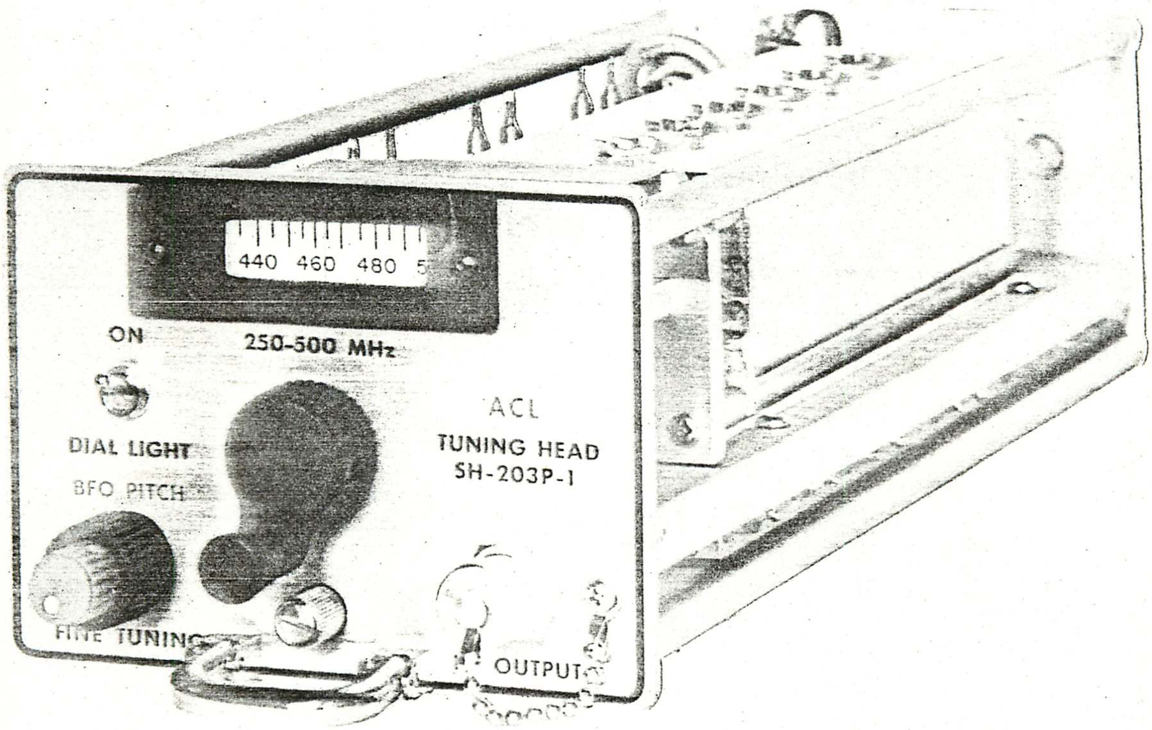

Figure 1-1. Tuning Head, SH-203P-1/AFC, Front View

SECTION I

GENERAL DESCRIPTION

1. Electrical

Tuning Head Type SH-203P-1/AFC, Figure 1-1, is a solid state module continuously tunable from 250 to 500 MHz. The module is designed for plug-in installation in VHF/UHF Receiver Type SR-209AFC.

Tuning is accomplished by rotating the coarse tuning control then the FINE TUNING control while observing the SIGNAL STRENGTH meter and TUNING METER on the associated receiver. A BFO adjustment is provided for CW reception. Frequency is indicated on a calibrated tape dial that can be rear lighted by the DIAL LIGHT switch.

The tuning head supplies an IF and SDU output at 21.4 MHz to the receiver for further signal processing and an LO output to a front panel connector for test. RF, AGC, AFC and power supply inputs are supplied from the receiver.

The tuning head includes an RF tuner subassembly (containing a six section inductuner, two RF stages of amplification, a mixer and a local oscillator tuned to track 60 MHz above the RF input) and a 60 to 21.4 MHz converter subassembly (containing a 60 MHz amplifier, an AFC controlled high beat local oscillator, a mixer, and a 21.4 MHz IF amplifier).

Delayed AGC voltage is applied to the input filter section of the RF tuner and the 60 MHz amplifier in the 60 to 21.4 MHz converter. Normal AGC voltage is applied to the 21.4 MHz IF amplifier in the 60 to 21.4 MHz converter. AFC voltage is applied to the 81.4 MHz local oscillator in the 60 to 21.4 MHz converter. The delayed and normal AGC voltages maintain a constant IF output level over a dynamic range of 70 dB minimum. The AFC voltage maintains a fixed IF output frequency relative to the IF passband.

2. Mechanical

Aluminum treated with iridite clear coat chemical film is used for construction of the front, back and main deck of the tuning head. Four brass cadmium plated rods hold the front and back panel in place.

The tuning head includes two brass subassemblies and a gear train. The brass subassemblies are silver plated and chemically treated to prevent tarnish. Within these subassemblies, active circuits are partitioned to minimize circuit interaction. Major component reference designations are silk-screened on the bottom cover. The solid black lines show the brass partitions. Alignment adjustments are also silk-screened, next to the adjustment.

On the front panel is a window for the tape dial, a coarse tuning control, a FINE TUNING control, a BFO PITCH control, a DIAL LIGHT switch, an LO OUTPUT connector and a panel fastener. The tuning control is connected to the dial tape and to the RF tuner subassembly through the gear train. The front panel is coated with zinc chromate primer and finished in gray enamel. Front panel markings are engraved.

On the rear panel, plugs P1, P3 and an alignment pin mate in receptacles in the receiver chassis.

SECTION II

SPECIFICATIONS

Frequency Range	250 to 500 MHz
Noise Figure	10 dB maximum
Intermediate Frequency	60 and 21.4 MHz
IF Rejection	90 dB minimum
Image Rejection	60 dB minimum
Local Oscillator Output	F_c + 60 MHz
Local Oscillator Radiation	5 μV maximum
Input Impedance	50 ohms nominal
Dimensions	3.41 inches high 4.72 inches wide 13.375 inches deep
Weight	Approximately 4.5 pounds

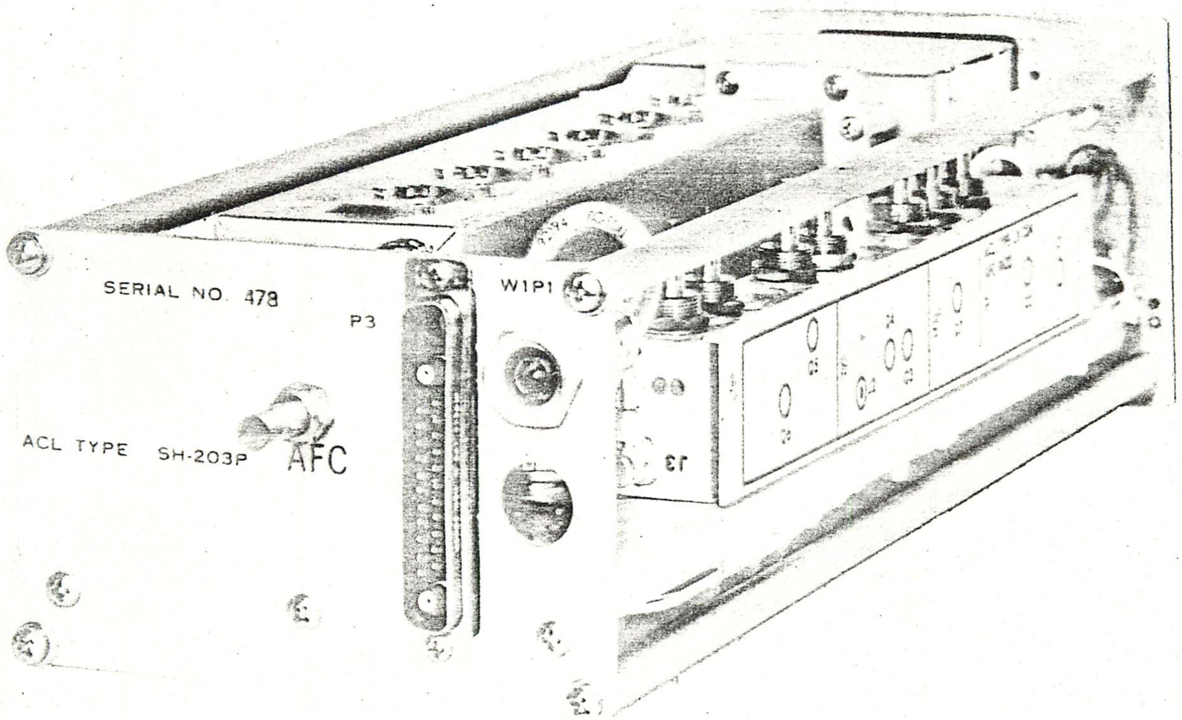

Figure 3-1. Tuning Head, SH-203P-1/AFC, Rear View

SECTION III

INSTALLATION AND OPERATION

1. Installation

Make certain that electrical power is turned OFF during installation of the plug-in unit. To install the tuning head, slide the plug-in unit into the front panel opening. Push the unit straight forward until properly engaged in the chassis. Finally, tighten the front panel fastener. Figure 3-1 shows a rear panel view. P1 applies the RF input signal to the tuner. P3 provides an output for the IF and SDU signals and an input for AFC, AGC and power supply voltages.

2. Operation

The tuning head is the RF front end of a receiving system. Tuning instructions for operation with the receiver will be found in the receiver instruction manual.

A. Control Functions

(1) DIAL LIGHT: This switch energizes the tuning tape dial light. It serves as a pilot light indicating that power is applied to the tuning head. The switch should be placed down (off) during battery operation to conserve the power supply.

(2) COARSE TUNING CRANK: Coarse frequency tuning is accomplished by rotating this crank. It is connected to the calibrated tape dial through a friction disc and gear train assembly. The friction disc will slip to prevent damage to the tape dial and gear train if the operator continues to rotate the turn crank past the high and low end frequency stops.

(3) FINE TUNING and BFO PITCH Controls: These controls are mounted on concentric shafts. The color of the control is keyed to the color of the control identifying label. Both controls permit a limited range of adjustment of the local oscillator frequency. The FINE TUNING control has a range of 500 KHz and is tuned to center the IF within the passband. The BFO PITCH control has a range of 100 KHz and is varied to provide an aural null during CW operation. A BFO is included on each IF amplifier in the associated receiver whose bandwidth is 250 KHz or less.

B. LO OUTPUT

The LO OUTPUT connector on the front panel permits the connection of test equipment to monitor the frequency of the local oscillator. It is capped with an RF shield which must be removed before test. When using this connector, connect the test equipment prior to RF tuning and measurement of the local oscillator frequency. This will prevent the load presented by the test equipment from detuning the local oscillator causing inacurracies in the measurement results. The local oscillator frequency is equal to F_c plus 60 MHz. The cap should be placed back on the connector at the completion of test.

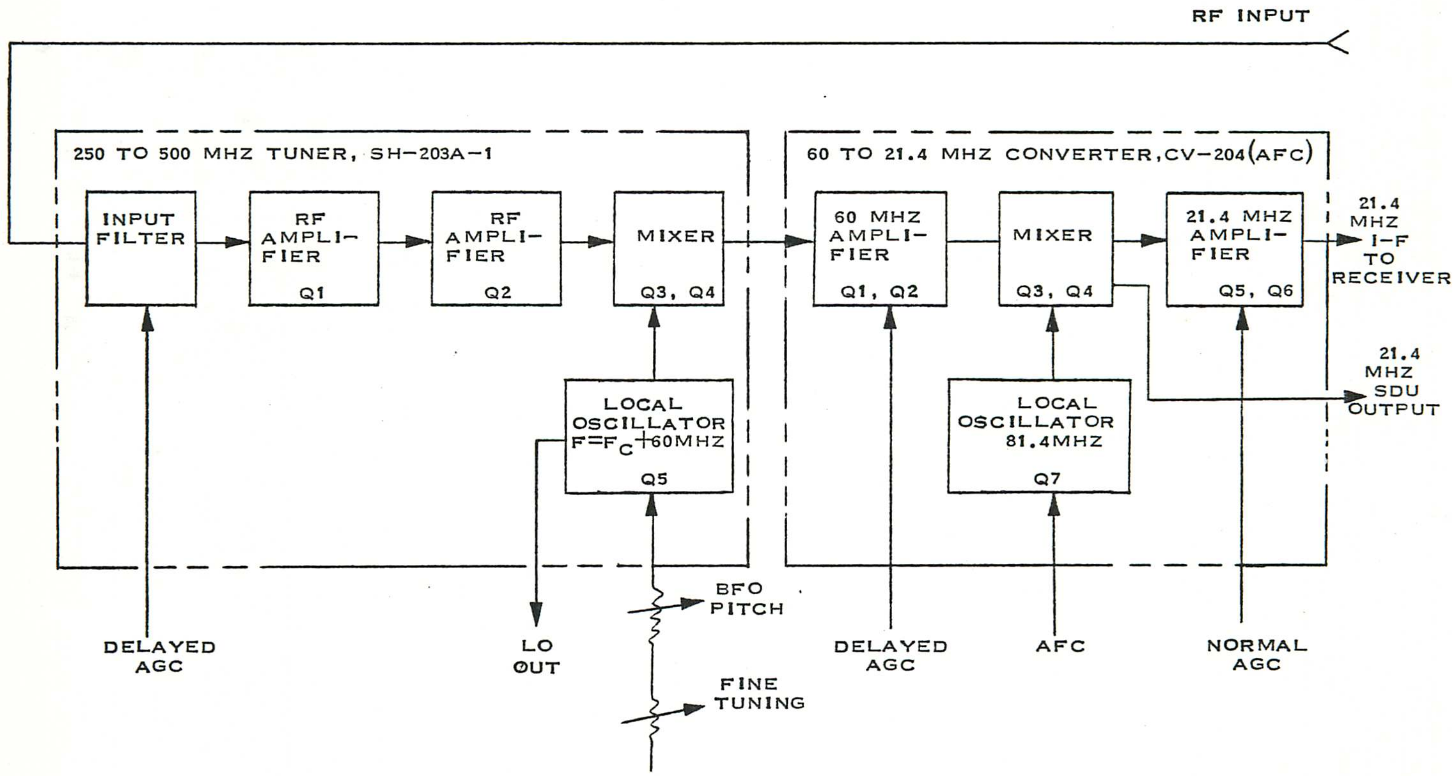

Figure 4-1. SH-203P-1/AFC Functional Block Diagram.

SECTION IV

THEORY OF OPERATION

1. General

The 250 to 500 MHz tuning head, Figure 4-1, amplifies the received signal and double converts to supply a 21.4 MHz IF output. Coarse frequency tuning varies the circuit elements of a ganged six-section inductuner. First conversion to 60 MHz is obtained, after RF amplification, by mixing the input signal with a high beat local oscillator. Fine frequency tuning and BFO pitch adjustment is accomplished by changing the frequency of the local oscillator. Local oscillator frequency is connected to the front panel for test. After selection and amplification, the 60 MHz signal is converted to the 21.4 MHz IF by mixing with an 81.4 MHz local oscillator. Mixer output is split to supply a signal display unit and a 21.4 MHz amplifier. AFC voltage is applied to the local oscillator and delayed and normal AGC voltages are applied to the input filter,the 60 and the 21.4 MHz amplifiers.

2. Tuning Head, SH-203P-1/AFC

The tuning head includes RF tuner SH-203A-1, and converter CV-204 (AFC). The RF tuner consists of an input filter network, the first RF amplifier, the interstage filter network, a high beat local oscillator, and a cascode mixer with its output filter. Input network, interstage network, output network and local oscillator are ganged by a six-section inductuner. Local oscillator tracks 60 MHz above the RF input signal. The converter consists of a cascode input amplifier, an 81.4 MHz local oscillator, a cascode mixer and a 21.4 MHz output amplifier. Both input and output amplifiers are gain controlled.

3. RF Tuner SH-203A-1

A. Input Network

The input network is a two section, parallel tuned, critically coupled bandpass filter. Antenna received signals are applied at J1. R1 to ground provides a static discharge path for the input coaxial feed. Low to high impedance transformation is achieved by capacitive divider C1, C2. First inductuner section includes L1A and L2 resonated by C3 and divider C1, C2. Second section consists of L1B and L3 resonated by C5, C6 and C7. The double tuned input network is ganged to similar tuned circuits in the RF amplifier and local oscillator stage. L2 and L3 enable factory adjustment of high end tuning and C3 and C5 low end tuning. Increased delayed AGC input to CR2, decreases the resistance of CR1, reducing the signal level at the junction of C2, C3 and C4. Preselected RF is supplied RF amplifier Q1 across capacitive divider C6, C7 for impedance stepdown.

B. First RF Amplifier

Q1 is a low noise common base amplifier. Degenerative feedback through C8 provides neutralization. Amplified RF is supplied the double tuned interstage network which follows.

C. Interstage Network

Inductuner sections 3 and 4 between first and second RF amplifiers provide interstage bandpass filtering. Third section L1C, L4 is resonated by C10 with L4 tapped for impedance stepdown. The effective "Q" of L1C is damped by R5 for increased bandwidth. Primary to secondary coupling has two paths. The high frequency path is through C11 and the low through C13. Fourth inductuner section contains L1D, L5 resonated by C12, C14 and C15. R21 across L1D is for bandwidth. L4 and L5 are factory adjustments for high end tuning. C10 and C12 enable low end trimming at alignment. The interstage network is coupled to the second RF amplifier by capacitive divider C14, C15.

D. Second RF Amplifier

Second RF amplifier Q2 is connected in a grounded base configuration. Bias is established in the emitter by R4 and in the collector by R7. The Q2 stage is neutralized by feedback from collector to emitter through C16. Amplified RF is supplied directly to tapped inductor L6 of the double tuned RF output network.

E. RF Output Network

First tuned network, L1E, L6 resonated by C18, is section five of the inductuner. L6 is tapped to provide impedance stepdown and enables factory adjustment of high end tuning. C18 adjusts low end trimming at alignment. L12, C41 and the reflected impedance of the oscillator tank through C20 make up the second tuned network. Filtered RF signal is supplied mixer Q3.

F. Local Oscillator

Common emitter oscillator Q5 generates the local oscillator signal. Sixth inductuner section L1F with tank circuit components L10, L11, C29 and C30 tunes 310 to 560 MHz. Feedback path through C31 sustains oscillation. R15 is unbypassed to supply negative feedback for stability. C29 enables high frequency trimming. FINE TUNING and BFO PITCH controls varie voltage supply between collector and base to affect 500 and 100 KHz change in local oscillator frequency respectively. C47 couples a monitoring output across 6 dB resistive pad R18, R19 and R20 to J3. Local oscillator signal is coupled out by C20 to the mixer.

G. Cascode Mixer

Common emitter stage Q3 is followed by common base stage Q4. RF and local oscillator signal combine in mixer Q3 which supplies fundamental, sum and difference frequencies to amplifier Q4. The output of Q4 is supplied to TP1, a monitoring test point and to a double tuned output network. A high impedance detector connected to TP1 effectively short circuits the tuned circuit permitting observation of the response characteristics of the preceding stages during RF alignment.

H. Double Tuned Output Network

The double tuned output network is designed to select the 60 MHz mixer frequency and reject all other mixer output components. L8 and L9 are adjusted at alignment for a 3 dB bandwidth of 6 MHz. Filtered 60 MHz IF is supplied J2 at 50 ohms and routed to converter CV-204 (AFC).

4. Converter CV-204 (AFC)

A. Input Amplifier

The 60 MHz IF is attenuated 6 dB by resistive pad R1, R2 and R3 and coupled by C1 to cascode stage Q1, Q2. Bias for the cascode pair is established by R5, R6, R8 and R10 with C29 at ground potential for a no signal (antenna) input condition. Delayed AGC input is supplied through C29 as automatic bias for gain controlled amplifier Q1. CR5 provides additional delay by introducing a 5.6 volt threshold which must be overcome before the AGC action will occur. For low level signals, delayed AGC input does not exceed the threshold level and the gain of Q1 is not impaired. For high level signals, delayed AGC input exceeds the threshold level and dc input at Q1 base causes Q1 collector current to increase and the potential between emitter and collector to drop. Q1 gain is thus decreased in direct proportion to RF signal strength. The output of Q1 is coupled by C3 across matching resistor R7 to common base amplifier Q2 which drives a double tuned filter.

B. Double Tuned Filter

Bandpass filter L1, C5 and L2, C8 is tuned to the 60 MHz IF. Coupling is provided by C7 and damping by R30. L1 and L2 enable adjustment at alignment. Filtered 60 MHz IF is supplied mixer Q3.

C. 81.4 MHz Local Oscillator

Local oscillator Q7 is connected in a common emitter configuration. DC bias conditions are established by R26 through R29. The local oscillator tank circuit consists of L7, C25 and CR7. Collector to emitter feedback for sustained oscillation is across C39. Zener diode CR6 (10 volts) sets a fixed voltage on the anode of voltage variable capacitor CR7 while the AFC voltage which is supplied from a source in the receiver is applied across C40, R36 and R29 to the cathode. As the AFC voltage varies it will cause a change in the capacitance of CR7 resulting in a correction of the local oscillator frequency. The characteristics of CR7 are such that the back bias of a positive going AFC signal will decrease the capacitance of the diode resulting in an increase in local oscillator frequency; the converse is true for a negative going AFC signal. Local oscillator output is coupled to the mixer through C10.

D. Cascode Mixer

Cascode stage Q3, Q4 consists of a common emitter mixer followed by a common base amplifier. RF and the local oscillator signal combine in the mixer. Carrier, sum and difference frequencies are amplified by Q4, and the difference 21.4 MHz IF is selected in the double tuned circuit which follows. L3 and L4 enable a 21.4 MHz center frequency adjustment for a 3 dB bandwidth of 4 MHz. Ten dB of isolation to low level SDU output J2 is provided by R17, R18 and R34. J2 connects to P3/A3 which routes the 21.4 MHz IF to the receiver where the signal is available for observation. The output of the filter is coupled to 21.4 MHz amplifier Q5.

E. 21.4 MHz Amplifier

Cascode amplifier Q5, Q6 operates similarly to the 60 MHz input amplifier Q1, Q2. Bias for the pair is established by R20, R22, R23 and R24 with C34 nearly fixed at ground potential for a no signal (antenna) input condition. Q5 is gain controlled by normal AGC input from the receiver. This should not be confused with delayed AGC which means that no control voltage is applied until a minimum signal level has been reached. The gain control characteristic is enhanced by factory selection of R19 value. The output of Q6 is coupled through a double tuned circuit and delivered at J3 as 21.4 MHz IF output. L5 and L6 the primary and secondary windings provide an alignment adjustment. CR3 and CR4 provide clipping of any extemely high signal levels that could overload succeeding stages in the receiver. J3 connects to P3/A2 which routes the 21.4 MHz IF to the receiver for further signal processing.

SECTION V

MAINTENANCE

1. General

The plug-in tuning head is completely transistorized and, consequently, will require little, if any, maintenance and repair. However, in the event that a malfunction occurs, this section of the manual contains information concerning the normal distribution of dc potentials on the various transistors and an alignment procedure which may be utilized in the event a component must be replaced.

CAUTION

> Component placement in the RF tuner is quite critical. Use great care when replacing parts to make certain that the new part is placed in exactly the same place with exactly the same lead length as that of the part replaced. Alignment should be undertaken only when the replaced part causes considerable reduction in overall performance.

Use standard troubleshooting techniques to aid in the isolation of the difficulty to a particular module or component. Maintenance personnel are also urged to become thoroughly familiar with the Theory of Operation section of this manual.

2. Test Equipment

The test equipment listed or their equivalents should be utilized in performing the alignment operations.

Sweep Generator, Telonic, SM-2000, with plug-in heads
Signal Generator, Hewlett-Packard, Model 608D
Signal Generator, Hewlett-Packard, Model 612D
Electronic Counter, Hewlett-Packard, Model 5245L
50 Ohm Detector, Telonic, XD-3A
High Impedance Detector, Figure 5-1
Oscilloscope, Tektronix Type 503
VTVM, RCA, WV-98C
Test Fixture, Figure 5-2
An assortment of cables, connectors, adapters and attenuation pads

The Telonic SM-2000 sweep generator has an external marker input jack. If the available sweep generator does not have such provisions, the output of the marker generator should be loosely coupled to the tuned circuits under alignment. Make sure that the marker injection does not upset the circuitry, remove the marker coupling and observe that no change in the response takes place.

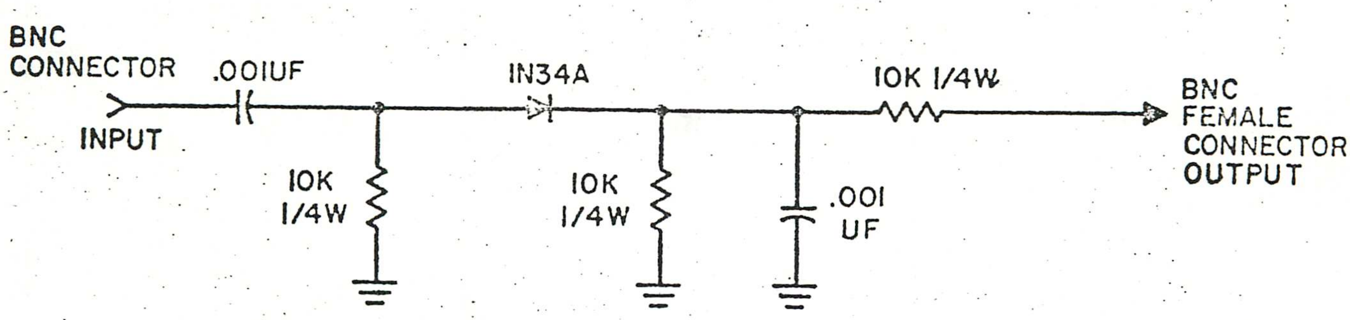

Figure 5-1. High Impedance Detector.

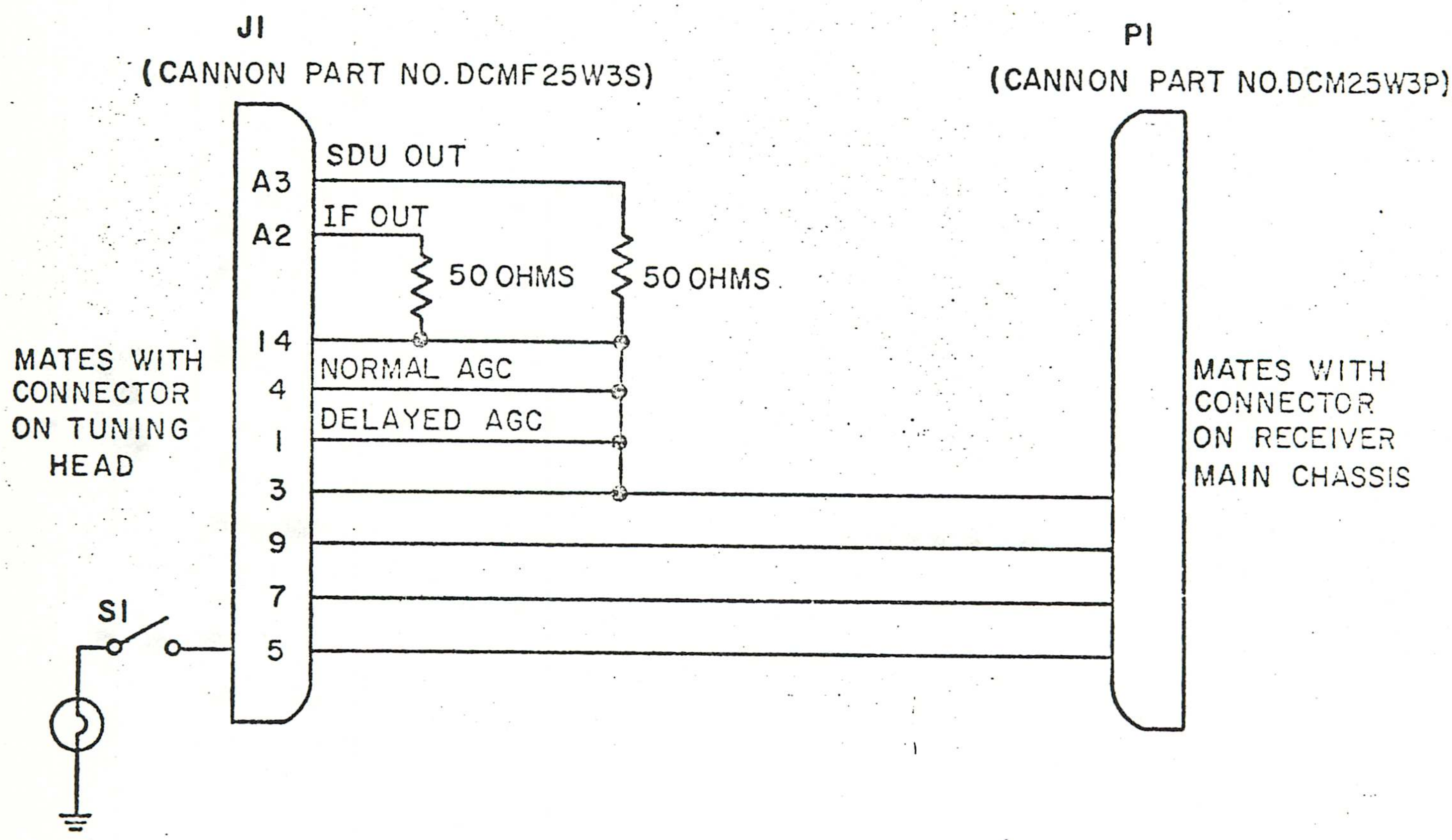

Figure 5-2. Test Fixture.

3. Tuning Head Mechanical Adjustments

A. General

The tuning head unit is ruggedly designed and manufactured and should require little, if any, mechanical adjustment. Periodically, mounting and set screws should be checked for tightness to avoid deterioration of performance, especially when operated in an environment which results in the application of vibrations or shocks. Other than these operations, mechanical maintenance is limited to clutch adjustment to eliminate slippage, frequency tape adjustments, and gear train parts replacement.

B. Friction Clutch Adjustments

Friction clutch adjustments should be made on an as required basis. Adjustment of the friction clutch should be made if the tuning crank turns excessively hard or if clutch slippage is evident while tuning.

(1) Turn the tuning head on its side. Locate the two retaining collars on the main tuning shaft.

(2) Loosen the two set screws in both retaining collars.

(3) Move the collars closer to the clutch plates (increased spring compression) to increase torque and reduce clutch slippage. Reduce spring compression by moving the two retaining collars away from the clutch plates for easier tuning. The distance from the retaining collar to the clutch plate on each end of the shaft should be the same.

(4) Tighten the set screws in each retaining collar.

(5) Rotate the tuning crank throughout the tuning range and note performance. Repeat steps 1 through 4, if required.

C. Dial Tape Adjustments

In the event that the tuning tape appears to have a large error, or if the gear train has been replaced, the tuning dial tape will required adjustment. This may be achieved by using the following procedures.

(1) Rotate the turn crank clockwise until the motion of the tuning tape is restrained by the inductuner stops at or near the last mark on the tape.

(2) Loosen the two allen head set screws securing the large gear to the inductuner shaft. Care should be exercised to assure that the large gear on the inductuner shaft does not disengage from the small drive gear on the gear train or the tension in the antibacklash springs may be released.

(3) While preventing movement of the inductuner from its stop with a screwdriver or other tool, rotate the front panel tuning crank until the highest mark on the tuning tape lines up with the hair-line. Do not wind tape more than 1 inch beyond last tape mark.

(4) Tighten the allen head set screws on the large gear.

(5) Rotate the tuning crank over the entire tuning range and note that the tuning action is smooth and free of any signs of binding.

D. Gear Train Parts Replacement

In the event that gear train parts require replacement, it is usually easier to replace the gear train and place the tuning head back in service. This permits the gear train to be returned to the factory for repair.

4. RF Tuner, SH-203A-1

A. Normal Operating Voltages

(1) Remove tuning unit from main chassis and connect test fixture, Figure 5-2, to supply power inputs.

(2) Rotate front panel turn crank to 250 MHz; center FINE TUNING control.

(3) Use the RCA VTVM Model WV-98C to measure voltage. Table 5-1 shows the voltages normally encountered.

Table 5-1. SH-203A-1 Transistor Voltages.

Transistor Symbol Number	Emitter	Base	Collector
Q1	0.34	0	-5.7
Q2	0.26	GRD	-5.7
Q3	6.0	5.8	0.25
Q4	0.25	0	-7.2
Q5	-6.2	-6.4	3.2

B. Local Oscillator Adjustment

When components in the local oscillator circuit are replaced, the frequency of the local oscillator should be checked and adjusted, if necessary.

(1) Rotate coarse tune crank for 500 MHz tape dial reading. Center FINE TUNING control.

(2) Disconnect W1P2 from J1 and connect a 612 signal generator to A1J1 on the RF tuner. Adjust the frequency accurately to 500 MHz and the output level to 200 microvolts.

(3) Disconnect W2P1 from J2 and monitor the IF output at A1J2 with a 5245L electronic counter. The frequency should be 60 MHz.

(4) Remove tuner cover and adjust C29 for 60 MHz.

C. RF Amplifier Alignment

(1) Connect test equipment, Figure 5-3. The RF output of the sweep generator should be connected to J1 on the RF tuner and the high impedance detector, Figure 5-1, should be connected to TP1.

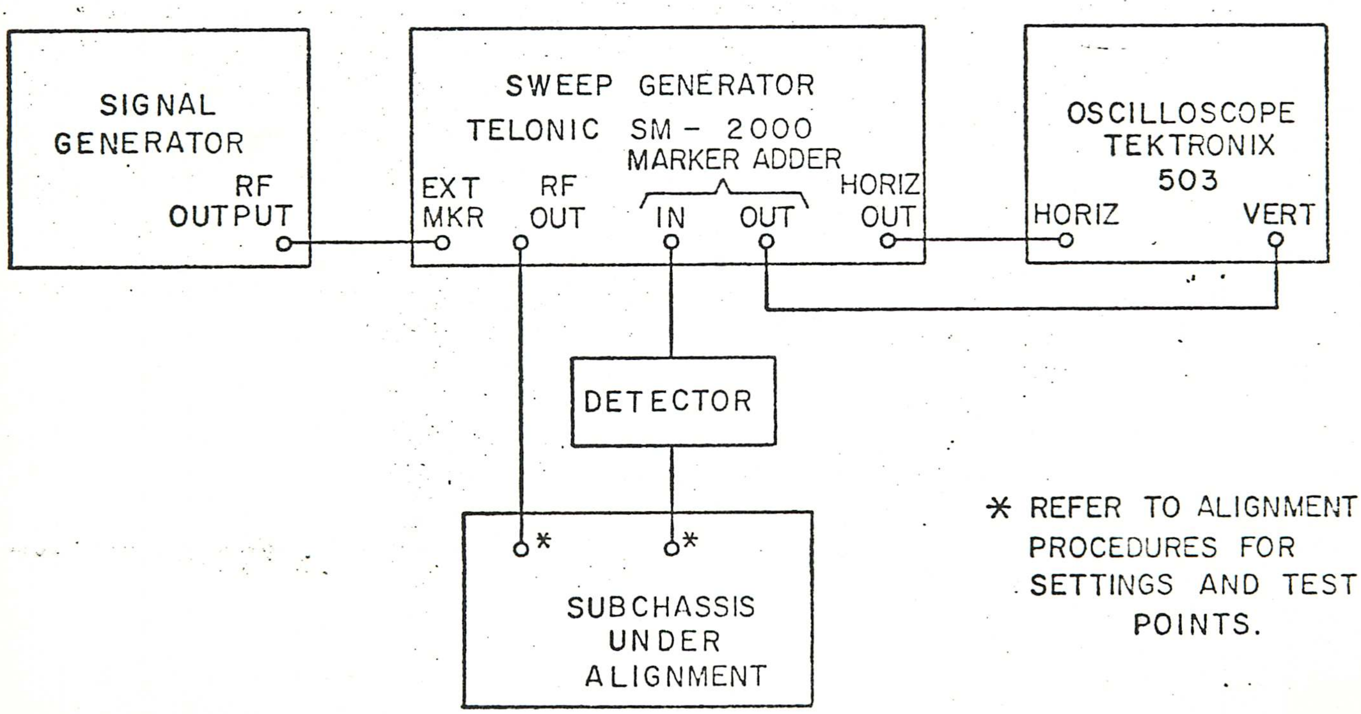

Figure 5-3. Alignment Test Setup.

(2) Adjust front panel turn crank for a 500 MHz indication on the tuning tape.

(3) Set the sweep generator and signal generator output frequency to 500 MHz.

(4) Adjust the horizontal gain of the oscilloscope for full scale deflection.

(5) Set the vertical gain to 1 millivolt per centimeter and the sweep generator output level for a 4 centimeter RF amplifier response on the oscilloscope.

(6) Adjust signal generator output and marker SIZE control on the sweep generator for a small "birdie" on the response.

(7) Locate five variable trimmer capacitors C18, C12, C10, C5 and C3 on the top side of the tuner chassis.

(8) Slowly adjust C18 for maximum symmetrical response as shown in Figure 5-4.

(9) Locate C12, again adjusting for maximum symmetrical response. Repeat for C10, C5 and C3. The 3 dB bandwidth is about 15 MHz but will reduce to as little as 10 MHz as the turn crank is rotated to 250 MHz.

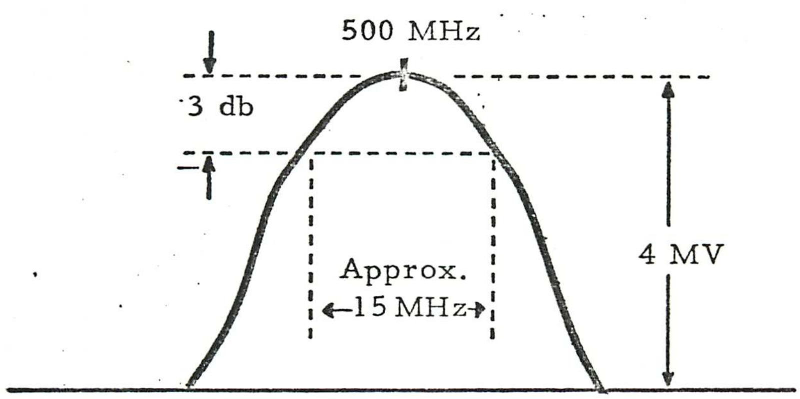

Figure 5-4. RF Amplifier Response.

D. IF Amplifier Alignment

(1) Connect the test equipment as shown in Figure 5-3. The RF output of the sweep generator should be connected to J1 on

the RF tuner and the XD3A 50 ohm detector should be connected to J2, IF output.

(2) Adjust the front panel turn crank for a 500 MHz indication on the tuning tape.

(3) Set the sweep generator and signal generator output frequency to 500 MHz.

(4) Adjust the horizontal gain of the oscilloscope for full scale deflection.

(5) Set the vertical gain to 1 millivolt per centimeter and the sweep generator output level for a 4 cm IF amplifier response on the oscilloscope.

(6) Adjust the signal generator output level and the marker SIZE control on the sweep generator for a small "birdie" on the response.

(7) Locate L8 and L9 on the top side of the RF tuner.

(8) Adjust L8 and L9 for maximum symmetrical response, Figure 5-5.

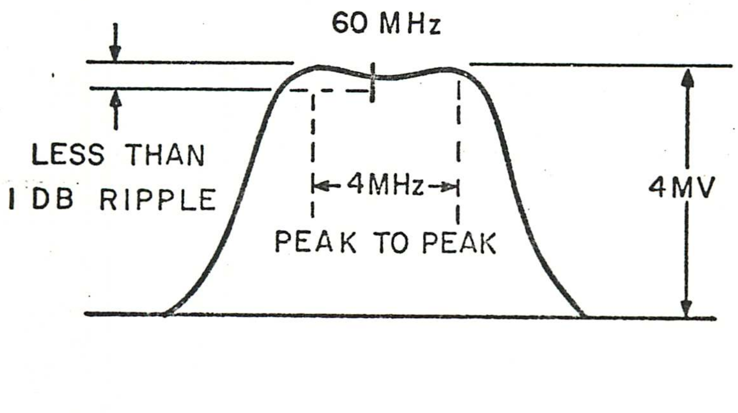

Figure 5-5. IF Output Response.

5. Converter CV-204 (AFC)

A. Normal Operating Voltages

(1) Remove tuning unit from main chassis and connect test fixture, Figure 5-2, to supply power inputs.

(2) Rotate front panel turn crank to 500 MHz; center FINE TUNING control.

(3) Use the RCA VTVM model WV-98C to measure voltage. Table 5-2 shows normal voltages encountered.

Table 5-2. CV-204 (AFC) Transistor Voltages.

Transistor Symbol Number	Emitter	Base	Collector
Q1	-2.00	-1.20	6.70
Q2	-0.67	GRD	9.90
Q3	-9.80	-9.20	-0.62
Q4	-0.62	GRD	8.00
Q5	-3.40	-2.60	3.60
Q6	-0.66	GRD	8.80
Q7	-1.20	1.60	7.20

B. Local Oscillator Adjustment

(1) Disconnect W2P2 from A2J1 and W4P1 from A2J3. Connect a 608D signal generator to A2J1 and a 5245L electronic counter to A2J3.

(2) Adjust the signal generator to provide a 60 MHz output at 200 microvolts.

(3) Observe counter indication of 21.4 MHz. Locate L7 on the top of the converter assembly and adjust for this frequency indication.

C. Alignment

(1) Remove five screws which secure the cover to the converter assembly.

(2) Connect a 60 ohm resistor across the output to the SDU at J2.

(3) Connect the test equipment, Figure 5-3. The RF output of the sweep generator should be connected to J1 and the 50 ohm detector XD3A should be connected to J2 SDU out.

(4) Set the sweep generator and signal generator output frequency to 60 MHz.

(5) Adjust the horizontal gain of the oscilloscope for full scale deflection.

(6) Set the vertical gain to 2 millivolts per centimeter and the sweep generator output level for a 3 cm response on the oscilloscope.

(7) Adjust the output level of the signal generator and the marker SIZE control on the sweep generator for a small 60 MHz "birdie" on the response.

(8) Locate L1, L2, L3 and L4 on the top of the converter assembly.

(9) Adjust L1 through L4 for maximum symmetrical response. The 3 dB bandwidth should be approximately 4 MHz, Figure 5-6.

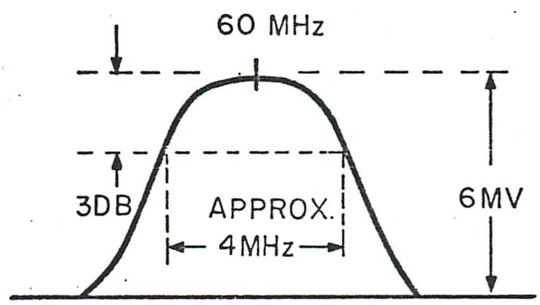

Figure 5-6. Converter Response, J2 Output.

(10) Remove 60 ohm resistor across R17 and connect XD3A detector to J3, 21.4 MHz IF out.

(11) Adjust L5 and L6 for maximum symmetrical response. The response shown in Figure 5-1 is applicable only the bandwidth will be narrower, about 3.5 MHz.

(12) Replace converter cover and install mounting screws.

SECTION VI

PARTS AND MANUFACTURERS LIST

1. Parts List.

NOTE

Any changes in the Parts List will be listed on the Addendum sheets at the front of this manual.

When ordering replacement parts from the manufacturer always include the following information:

1. Instrument model number
2. Instrument serial number
3. Module number
4. Module serial number
5. Component circuit symbol number (Q1, C13, etc.)
6. Component description
7. Component part number
8. Component manufacturer's name
9. Quantity desired

RF PLUG-IN HEAD, 250-500 MHz, SH-203P-1 (AFC)

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	ACL CODE NO.	MFR	PART NO.	QTY REQ
A1	Tuner 250-500 MHz		ACL	SH-203A-1	1
A2	Converter 60-21.4 MHz		ACL	CV-204 (AFC)	1
CR1	Semiconductor Device, Diode		PSI	1N718A	1
DS1	Lamp, Incandescent		MIL	MS18209-387	1
P1	Not Used				
P2	Not Used				
P3	Connector, Plug, Electrical		Cannon	DCM25W3P	1

RF PLUG-IN HEAD, 250-500 MHz, SH-203P-1 (AFC)					
SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	ACL CODE NO.	MFR	PART NO.	QTY REQ
R1 R2	Resistor, Variable (Concentric) R1 250 ohms 2 w, R2 100 ohms 2 w		AB	JJC90519	1
R3	Resistor, Fixed, Composition 750 ohms ±5% 1/4 w		AB	CB7515	1
S1	Switch, Toggle, SPST		C & K	7101	1
W1	Cable Assy, Coaxial		ACL	AC-076-72	1
W1P1	Connector, Plug, Elec. P/O W1		Gremar	8205B	1
W1P2	Connector, Plug, Elec. P/O W1		MIL	UG-88/U	2
W2	Cable Assy, Coaxial		ACL	AC-076-73	1
W2P1	Connector, Plug, Elec. P/O W1		FXR	5116-037475	4
W2P2	P/O W2 Same as W2P1				
W3	Cable Assy, Coaxial		ACL	AC-801-3	1
W3P1	P/O W3 Same as W2P1				
W3P2	Connector P/O W3		Cannon	DM53741-5000	2
W4	Cable Assy, Coaxial		ACL	AC-801-4	1

RF PLUG-IN HEAD, 250-500 MHz, SH-203P-1 (AFC)

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	ACL CODE NO.	MFR	PART NO.	QTY REQ
W4P1	P/O W4 Same as W2P1				
W4P2	Same as W3P2 P/O W4				
W5	Cable Assy, Coaxial		ACL	AC-076-113	1
W5P1	Same as W1P2, P/O W5				
W5J1	Connector, Receptacle, Elec. P/O W5		FXR	95700	1
XDS1	Lampholder		Dialco	8-1930XP24	1

250-500 MC RF TUNING HEAD, SH-203A-1

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	ACL CODE NO.	MFR	PART NO.	QTY REQ
C1	Capacitor, Ceramic Tubular 8.2 ± 0.25 pf 500 vdc		Erie	301-COH-829C	3
C2	Same as C14				-
C3	Capacitor, Variable 0.5 - 8.5 pf		Roanwell	MG-1309	6
C4	Capacitor, Tubular 0.33 pf ± 10%		QC	MC-0.33	2
C5	Same as C3				
C6	Capacitor, Ceramic Tubular 2.2 ±0.25 pf 500 vdc		Erie	301-COJ-229C	1
C7	Capacitor, Ceramic Tubular 4.7 ± 0.25 pf 500 vdc		Erie	301-COH-479C	2
C8	Capacitor, Ceramic Tubular 0.5 ± 0.25 pf 500 vdc		Erie	301-COK-508C	3
C9	Capacitor, Fxd, Mica Dielectric 24 pf ± 10% 500 vdc		Erie	654-017-240K	2
C10	Same as C3				
C11	Capacitor, Tubular 0.22 pf ± 10%		QC	MC-0.22	1
C12	Same as C3				
C13	Capacitor, Tubular 0.36 pf ± 10%		QC	MC-0.36	1
C14	Capacitor, Ceramic Tubular 1.5 ± 0.25 pf 500 vdc		Erie	301-COK-159C	3
C15	Same as C1				
C16	Same as C8				
C17	Same as C9				
C18	Same as C3				
C19	Same as C14				
C20	Same as C4				
C21	Capacitor, Ceramic Die. 0.01 uf ± 20%		Sprague	19C214	1
C22	Capacitor, Feedthru 470 pf ± 20%		AB	FA5C-4712	9
C23	Same as C1				

250-500 MC RF TUNING HEAD, SH-203A-1

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	ACL CODE NO.	MFR	PART NO.	QTY REQ
C24	Capacitor, Tubular 0.75 pf ± 10%		QC	MC-0.75	2
C25	Capacitor, Ceramic Die. 1000 pf ± 20% 100 vdc		MIL	CK60AW102M	2
C26	Capacitor, Dipped Mica 10 pf ± 5% 500 vdc		Arco	DM15-100J	1
C27	Capacitor, Standoff 47 pf ± 10%		AB	SS5A-4701	1
C28	Same as C22				
C29	Same as C3				
C30	Capacitor, Ceramic Tubular 5.0 ± 0.25 pf 500 vdc		Erie	301-COH-509C	1
C31	Capacitor, Tubular 2.4 pf ± 10%		QC	MC2.4	1
C32	Same as C8				
C33	Not used				
C34	Same as C22				
C35	Same as C22				
C36	Same as C22				
C37	Same as C22				
C38	Same as C22				
C39	Same as C22				
C40	Same as C22				
C41	Same as C24				
C42	Capacitor, Standoff 470 pf ± 20%		AB	SS5A-4712	1
C43	Capacitor, Ceramic Tubular 3.3 ± 0.25 pf 500 vdc		Erie	301-COJ-339C	3
C44	Same as C25				
C45	Capacitor, Fixed, Tantalum 150 uf 15 vdc ± 10%		MIL	CS13BD157K	2
C46	Same as C45				

250-500 MC RF TUNING HEAD, SH-203A-1

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	ACL CODE NO.	MFR	PART NO.	QTY REQ
C47	Capacitor, Tubular 0.18 pf ± 10%		QC	MC0.18	1
C48	Capacitor, Feedthru 47 pf ± 10%		AB	FA5C-4701	1
C49	Capacitor, Feedthru 1000 pf GMV		AB	FA5C-102W	1
C50	Capacitor, Standoff 1000 pf GMV		AB	SS5D-102W	1
C51	Capacitor, Tubular 4.3 ± 10%		QC	MC4.3	1
C52	Same as C43				
C53	Same as C43				
C54	Same as C7				
CR1	Semiconductor, Diode		HP	HPA-3001 or (5082-3039)	1
CR2	Semiconductor, Diode		MIL	1N754A	1

250-500 MC RF TUNING HEAD, SH-203A-1

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	ACL CODE NO.	MFR	PART NO.	QTY REQ
J1	Connector, Receptacle, BNC Type		FXR	UG-1094/U	1
J2	Connector, Receptacle, Sub. Min.		FXR	5116-058350	1
J3	Connector, Receptacle, Type BNC		FXR	UG-185/U	1
L1	Inductuner, Mallory UHF, Modified		ACL	A-123-2	1
L2	Inductor		ACL	B-045-5	5
L3	Same as L2				
L4	Same as L2				
L5	Same as L2				
L6	Same as L2				
L7	Inductor		ACL	A-107-18	1
L8	Inductor, Variable		ACL	AB-002-5	2
L9	Same as L8				
L10	Inductor		ACL	B-045-1	1
L11	Inductor		ACL	AB-024-11	1
L12	Inductor		ACL	A-107-6	1
Q1	Transistor, Germanium, PNP			2N2415	1
Q2	Transistor, Germanium, PNP			2N2996	3
Q3	Same as Q2				
Q4	Same as Q2				
Q5**	Transistor, Silicon, NPN		KMC	K2615	1

**Transistor case must be isolated from ground by using heat shrinkable tubing around transistor.

250-500 MC RF TUNING HEAD, SH-203A-1

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	ACL CODE NO.	MFR	PART NO.	QTY REQ
R1	Resistor, Fixed, Composition 100 K ohms ± 5% 1/4 w		AB	CB1045	1
R2	Resistor, Fixed, Composition 7.5 K ohms ± 5% 1/4 w		AB	CB7525	2
R3	Resistor, Fixed, Composition 3.9 K ohms ± 5% 1/4 w		AB	CB3925	2
R4	Same as R2				
R5	Resistor, Fixed, Composition 2 K ohms ± 5% 1/4 w		AB	CB2025	1
R6	Resistor, Fixed, Composition 820 ohms ± 5% 1/4 w		AB	CB8215	1
R7	Same as R3				
R8	Resistor, Fixed, Composition 3 K ohms ± 5% 1/4 w		AB	CB3025	1
R9	Resistor, Fixed, Composition 39 K ohms ± 5% 1/4 w		AB	CB3935	2
R10	Same as R9				
R11	Resistor, Fixed, Composition 2.4 K ohms ± 5% 1/4 w		AB	CB2425	1
R12	Resistor, Fixed, Composition 2.7 K ohms ± 5% 1/4 w		AB	CB2725	1
R13	Resistor, Fixed, Composition 11 K ohms ± 5% 1/4 w		AB	CB1135	1
R14	Resistor, Fixed, Composition 8.2 K ohms ± 5% 1/4 w		AB	CB8225	1
R15	Resistor, Fixed, Composition 1.5 K ohms ± 5% 1/4 w		AB	CB1525	1
R16	Resistor, Fixed, Composition 91 ohms ± 5% 1/4 w		AB	CB9105	2
R17	Same as R16				
R18	Resistor, Fixed, Composition 300 ohms ± 5% 1/4 w		AB	CB3015	2
R19	Resistor, Fixed, Composition 18 ohms ± 5% 1/4 w		AB	CB1805	1
R20	Same as R18				
R21	Resistor, Fixed, Composition 4.7 K ohms ± 5% 1/4 w		AB	CB4725	1
R22	Resistor, Fixed, Composition 220 ohms ± 5% 1/4 w		AB	CB2215	1
R23	NOT USED				

25-500 MC RF TUNING HEAD, SH-203A-1

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	ACL CODE NO.	MFR	PART NO.	QTY REQ
R24	Resistor, Fixed, Composition 1.2 K ohms ± 5% 1/4 w		AB	CB1225	1
R25	Resistor, Fixed, Composition 330 ohms ± 5% 1/4 w		AB	CB3315	1
TP1	Jack, Test Point		Sealectro	SKT-12	1

60-21.4 MHz CONVERTER, CV-204 (AFC MOD)

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
C1	Capacitor, Fxd, Ceramic Die 1000 pf 20% 1000 vdcw	MIL	CK60AW102M	11
C2	Capacitor, Fxd, Ceramic (Standoff) 1000 pf GMV	AB	SS5A-102W	4
C3	Same as C1			
C4	Not Used			
C5	Same as C8			
C6	Same as C1			
C7	Capacitor, Fxd, Composition 1.0 pf ±10% 500 vdcw	QC	MC 1.0	1
C8	Capacitor, Fxd, Mica Die 27 pf ±5% 500 V	Arco	DM10-270J	2
C9	Capacitor, Fxd, Composition 3.0 pf ±10%	QC	MC3.0	2
C10	Same as C9			
C11	Same as C1			
C12	Capacitor, Fixed, Mica Die 22 pF ±5% 500 v	Arco	DM10-220J	3
C13	Same as C1			
C14	Capacitor, Fxd, Ceramic Die 6.8 pf NPO ±0.25 pf ±60 ppm	Erie	301-COH-689C	1
C15	Same as C12			
C16	Capacitor, Fxd, Mica Die 120 pf ±5%	Arco	DM10-121J	1
C17	Same as C1			
C18	Same as C2			
C19	Same as C1			
C20	Same as C1			
C21	Capacitor, Fxd, Mica Die 15 pf ±5%	Arco	DM10-150J	1
C22	Capacitor, Fxd, Composition 1.8 pf ±10% 500 vdcw	QC	MC 1.8	1
C23	Same as C12			
C24	Capacitor, Fxd, Mica Die 100 pf ±5%	Arco	DM10-101J	1

60-21.4 MHz CONVERTER, CV-204 (AFC MOD)

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
C25	Capacitor, Fxd, Ceramic Die 1.0 pf ±0.25 pf NPO ±250 ppm	Erie	301-COK-109C	1
C26	Same as C2			
C27	Same as C1			
C28	Capacitor, Fxd, Ceramic (Feedthru) 1000 pf, GMV	AB	FA5C-102W	10
C29	Same as C28			
C30	Same as C28			
C31	Same as C28			
C32	Same as C28			
C33	Same as C28			
C34	Same as C28			
C35	Same as C28			
C36	Same as C28			
C37	Same as C2			
C38	Same as C1			
C39	Capacitor, Fxd, Ceramic Die 2.2 ±0.25 pf 500 vdcw	Erie	301-COJ-229C	1
C40	Same as C28			
C41	Capacitor, Fxd, Mica Die 10 pf ±5% 500 vdcw	Arco	DM10-100J	1
C42	Same as C1			

60-21.4 MHz CONVERTER, CV-204 (AFC MOD)

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
CR1	Not Used			
CR2	Not Used			
CR3	Semiconductor Device, Diode	MIL	1N251	2
CR4	Same as CR3			
CR5	Semiconductor Device, Diode	CDC	1N752A	1
CR6	Semiconductor Device, Diode	CDC	1N758A	1
CR7	Varicap	PSI/TRW	PC115	1
J1	Connector, Receptacle, Electrical	FXR	5116-054900	3
J2	Same as J1			
J3	Same as J1			
L1	Inductance Standard, Variable	ACL	AC-184-0	2
L2	Same as L1			
L3	Inductance Standard, Variable	ACL	AC-184-3	4
L4	Same as L3			
L5	Same as L3			
L6	Same as L3			
L7	Coil, RF	ACL	AC-184-11	1
L8	Not Used			
L9	Inductance Standard, Fxd 3.3 uh	CTC	2960-34-2	4
L10	Same as L9			
L11	Same as L9			

60-21.4 MHz CONVERTER, CV-204 (AFC MOD)

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	ACL CODE NO.	MFR	PART NO.	QTY REQ
L12	Same as L9				
Q1	Transistor		Fairchild	2N 3337	2
Q2	Transistor		ACL	SA395	4
Q3	Transistor		Fairchild	2N 918	1
Q4	Same as Q2				
Q5	Same as Q1				
Q6	Same as Q2				
Q7	Same as Q2				
R1	Resistor, Fixed, Composition 150 ohms ±5% 1/4 W		AB	CB1515	3
R2	Resistor, Fixed, Composition 36 ohms ±5% 1/4 W		AB	CB3605	1
R3	Same as R1				
R4	Resistor, Fixed, Composition 2 K ohms ±5% 1/4 W		AB	CB2025	1
R5	Resistor, Fixed, Composition 2.4 K ohms ±5% 1/4 W		AB	CB2425	2
R6	Resistor, Fixed, Composition 1 K ohms ±5% 1/4 W		AB	CB1025	6
R7	Resistor, Fixed, Composition 1.8 K ohms ±5% 1/4 W		AB	CB1825	1
R8	Resistor, Fixed, Composition 5.6 K ohms ±5% 1/4 W		AB	CB5625	1
R9	Resistor, Fixed, Composition 1.3 K ohms ±5% 1/4 W		AB	CB1325	1
R10	Same as R6				
R11	Resistor, Fixed, Composition 11 K ohms ±5% 1/4 W		AB	CB1135	1
R12	Resistor, Fixed, Composition 3.3 K ohms ±5% 1/4 W		AB	CB3325	2

60-21.4 MHz CONVERTER, CV-204 (AFC MOD)

SYM OR ITEM	NOMENCLATURE OR DESCRIPTION	MFR	PART NO.	QTY REQ
R13	Same as R6			
R14	Same as R6			
R15	Resistor, Fxd, Composition 100 ohms ±5% 1/4W	AB	CB1015	4
R16	Not Used			
R17	Resistor, Fxd, Composition 470 ohms ± 5% 1/4W	AB	CB4715	1
R18	Same as R15			
R19	Resistor, Fxd, Composition 47 K ohms ±5% 1/4W	AB	CB4735	1
R20	Same as R5			
R21	Same as R15			
R22	Same as R6			
R23	Same as R6			
R24	Resistor, Fxd, Composition 6.2 K ohms ± 5% 1/4W	AB	CB6225	1
R25	Resistor, Fxd, Composition 20 K ohms ±5% 1/4W	AB	CB2035	1
R26	Same as R12			
R27	Resistor, Fxd, Composition 4.7 K ohms ±5% 1/4W	AB	CB4725	3
R28	Resistor, Fxd, Composition 430 K ohms ±5% 1/4W	AB	CB4345	1
R29	Resistor, Fxd, Composition 43 K ohms ±5% 1/4W	AB	CB4335	1
R30	Same as R27			
R31	Same as R27			
R32	Resistor, Fxd, Composition 10 K ohms ±5% 1/4W	AB	CB1035	1
R33	Resistor, Fxd, Composition 12 K ohms ±5% 1/4W	AB	CB1235	1
R34	Same as R15			
R35	Same as R1			
R36	Resistor, Fxd, Composition 15K ohms ±5% 1/4W	AB	CB1535	1

2. Manufacturer's List

Abbreviation	Name and Adress
AB	Allen Bradley Company 1201 South 2nd Street Milwaukee, Wisconsin 53212
Amperex	Amperex Electronic Corporation 230 Duffy Avenue Hicksville, New York 11801
Amphenol	The Amphenol R. F. Division Bunker-Ramo Corporation 33 E. Franklin Street Danbury, Connecticut 06813
API	Angstrohm Presision, Inc. 7811 Lemona Avenue Van Nuys, California 91405
ARC	Applied Research Corporation 76 S. Bayles Avenue Port Washington, New York 11050
Arco	Arco Electronics, Inc. Community Drive Great Neck, New York 11022
ACL	Astro Communication Laboratory 9125 Gaither Road Gaithersburg, Maryland 20760
Augat	Augat, Inc. 33 Perry Avenue Attleboro, Massachusetts 02703
Beckman	Beckman Instruments, Inc. 2500 Harbor Blvd. Fullerton, California 92634
Belden	Belden Corporation P. O. Box 341 Richmond, Indiana 47374
Bourns	Bourns, Inc., Trimpot Division 1200 Columbia Avenue Riverside, California 92507

Bussman	Bussman Mfg. Division McGraw-Edison Company 2536 W. University Street St. Louis, Missouri 63017
CTC	Cambridge Thermionic Corp. 445 Concord Avenue Cambridge, Massachusetts 02138
Central	Centralab Electronics Division of Globe Union Inc. 5757 N. Green Bay Avenue Milwaukee, Wisconsin 53201
Chicago	Chicago Miniature Lamp Works 4433 Ravenswood Avenue Chicago, Illinois 60640
Clarostat	Clarostat Mfg. Company Inc. Lower Washington Street Dover, New Hampshire 03820
CTS	CTS Corporation 1142 W. Beardsley Elkhart, Indiana 46514
CH	Cutler-Hammer, Inc. 420 N. 27th Street Milwaukee, Wisconsin 53216
Dialco	Dialight Company Sub of Digitronics Corp. 60 Stewart Avenue Brooklyn, New York 11237
Dickson	Dickson Electronics Corp 8700 E. Thomas Road P.O. Box 1390 Scottsdale, Arizona 85252
Elco	Elco Corporation Maryland Road & Computer Avenue Willow Grove, Pennsylvania 19090
Elmenco	See Arco
Erie	Erie Technological Products Inc. 644 W. 12th Street Erie, Pennsylvania 16512

Fairchild	Fairchild Semiconductor Corp. Division of Fairchild Camera and Instrument Corp. 464 Ellis Street Mountain View, California 94040
FXR	FXR Amphenol R.F. Division 33 E. Franklin Street Danbury, Connecticut 06813
GE	General Electric Company Miniature Lamp Department Nela Park Cleveland, Ohio 44112
GI	General Instrument Company 65 Gouverneur Street Newark, New Jersey 07104
GRFF	General R.F. Fittings, Inc. P.O. Box 278 Cove Road Port Salerno, Flordia 33492
Gulton	Gulton Industries Alkaline Battery Division 212 Durham Avenue Metuchen, New Jersey 08840
HHS	Herman H. Smith, Inc. 812 Snediker Avenue Brooklyn, New York 11207
Honeywell	Honeywell Incorporate Micro Switch Division Chicago & Spring Streets Freeport, Illinois 61032
Hopkins	Hopkins Engineering Company Sub Maxon Electronics Corp. 12900 Foothill Boulevard San Fernando, California 91342
HPA	Hewlett-Packard Company H.P. Associates 1501 Page Mill Road Palo Alto, California 94304

Hubbell	Harvey Hubbell, Inc. State Street & Bostwick Avenue Bridgeport, Connecticut 06602
IRC	International Resistance Company Division of TRW Inc. 401 N. Broad Street Philadelphia, Pennsylvania 19108
ITT Cannon	ITT Cannon Electric 666 E. Dyer Road Santa Ana, California
ITT Gremar	ITT Gremar Inc. 10 Micro Drive Woburn, Massachuetts 01801
JFD	JFD Electronics Corp 15th and 62nd Street Brooklyn, New York 11219
Johanson	Johanson Mfg. Company P.O. Box 329 Boonton, New Jersey 07005
Johnson	E.F. Johnson Company 299 10th Avenue S.W. Waseca, Minnesota 56093
Littelfuse	Littelfuse, Inc. 800 E. Northwest Highway Des Plaines, Illinois 60016
Mallory	P.R. Mallory and Company 3029 East Washington Street Indianapolis, Indiana 46206
McCoy	McCoy Electronics Company Watts Chestnut Street Mt. Holly Springs, Pennsylvania 17065
Microdot	Microdot Inc. 220 Pasadena Avenue South Pasadena, California 91030
Micrometals	Micrometals Company 228 N. Sunset City of Industry, California 91747

Microwave	Microwave Associates, Inc. South Avenue Burlington, Massachusetts 01801
MIL (81349)	Military Specification
Motorola	Motorola Semiconductor Products 5005 E. McDowell Road Phoenix, Arizona 85008
MS (96906)	Military Standards
Nytronics	Nytronics, Inc. 10 Pelham Parkway Pelham Manor, New York 10803
Oak	Oak Manufacturing Company Division of Oak Electro/Netics Corp S. Main Street Crystal Lake, Illinois 60014
OSM	Omni Spectra Inc. 24600 Hallwood Court Farmington, Michigan
Perrott	Perrott Engineering Labs, Inc. 1020 N. Fillmore Street Arlington, Virginia 22201
Piezo	Piezo Crystal Company 100 K Street Carlisle, Pennsylvania 17013
QC	Quality Components Inc. P.O. Box 113 St. Mary's, Pennsylvania 15857
Quam	Quam Nichols Company 218 Marquette Road Chicago, Illinois 60637
Raytheon	Raytheon Company 141 Spring Street Lexington, Massachuetts 02173
RCA	Radio Corporation Solid State Division Route 202 Somerville, New Jersey 08876

Reon	Reon Resistor Corp 155 Saw Mill Road Yonkers, New York 10701
Relcom	Relcom 2329 Charleston Road Mountain View, California 94040
Roanwell	Roanwell Corporation 180 Varick Street New York, New York 10014
Sangamo	Sangamo Electric Company Microsonics Division 60 Winter Street Weymouth, Massachusetts 02188
Sprague	Sprague Electric Company 125 Marshall Street North Adams, Massachusetts 01247
Sylvania	Sylvania Electric Products, Inc. 730 Third Avenue New York, New York 10017
Teledyne	Teledyne Philbrick Nexus Allied Drive At Route 128 Dedham, Massachusetts 02026
TI	Texas Instruments, Inc. P.O. Box 5012 North Central Expressway Dallas, Texas 75222
TRW	TRW Incorporated Semiconductor Division 14520 Aviation Blvd. Lawndale, California 90260
UTC	United Transformer Company 150 Varick Street New York, New York 10013
Wilco	Wilco Corporation 4030 W. 10th Street P.O. Box 22248 Indianapolis, Indiana 46222

SECTION VII

ILLUSTRATIONS AND SCHEMATICS

NOTES:

UNLESS OTHERWISE SPECIFIED:

ALL RESISTOR VALUES ARE IN OHMS, ±5%, 1/4W.

PARTIAL REFERENCE DESIGNATIONS ARE SHOWN:

FOR COMPLETE DESIGNATION, PREFIX WITH A1.

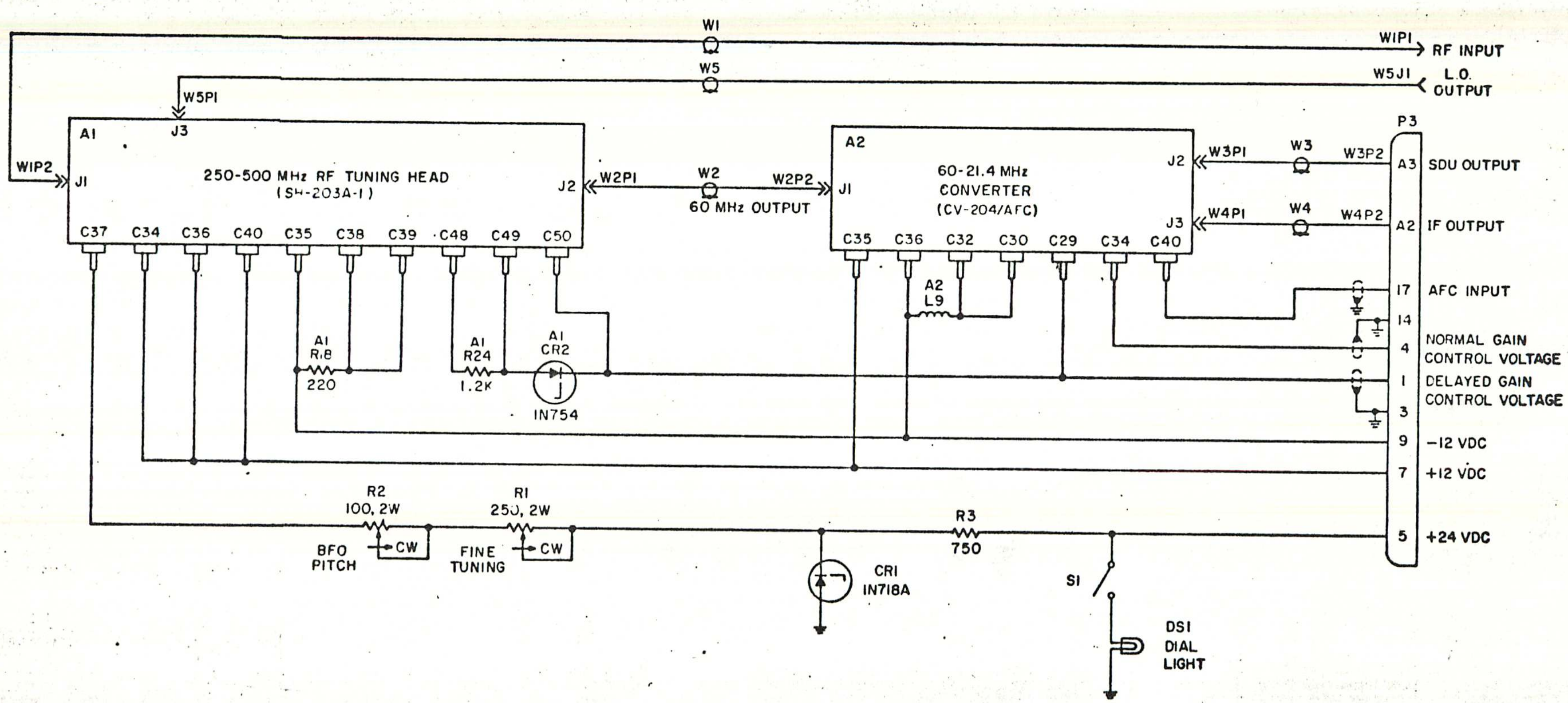

Figure 7-1. 250 to 500 MHz RF Plug-In Unit, SH-203P-1/AFC.

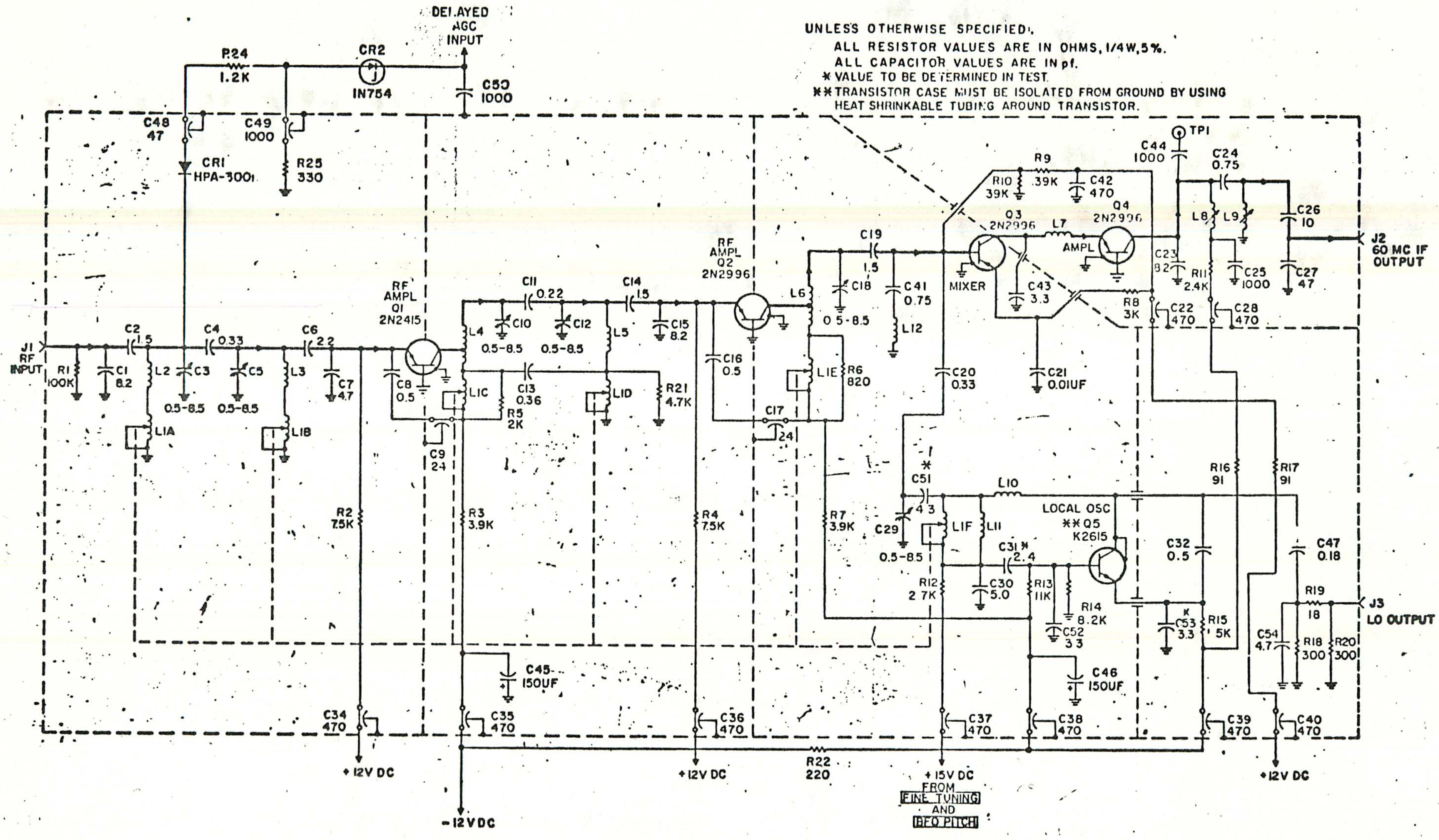

Figure 7-3. RF Tuning Head, SH-203A-1.

NOTES:
UNLESS OTHERWISE SPECIFIED:
ALL RESISTOR VALUES ARE IN OHMS, ± 5%, 1/4W.
ALL CAPACITOR VALUES ARE IN UUF.
VALUE TO BE DETERMINED BY TEST: NOMINAL VALUE SHOWN.

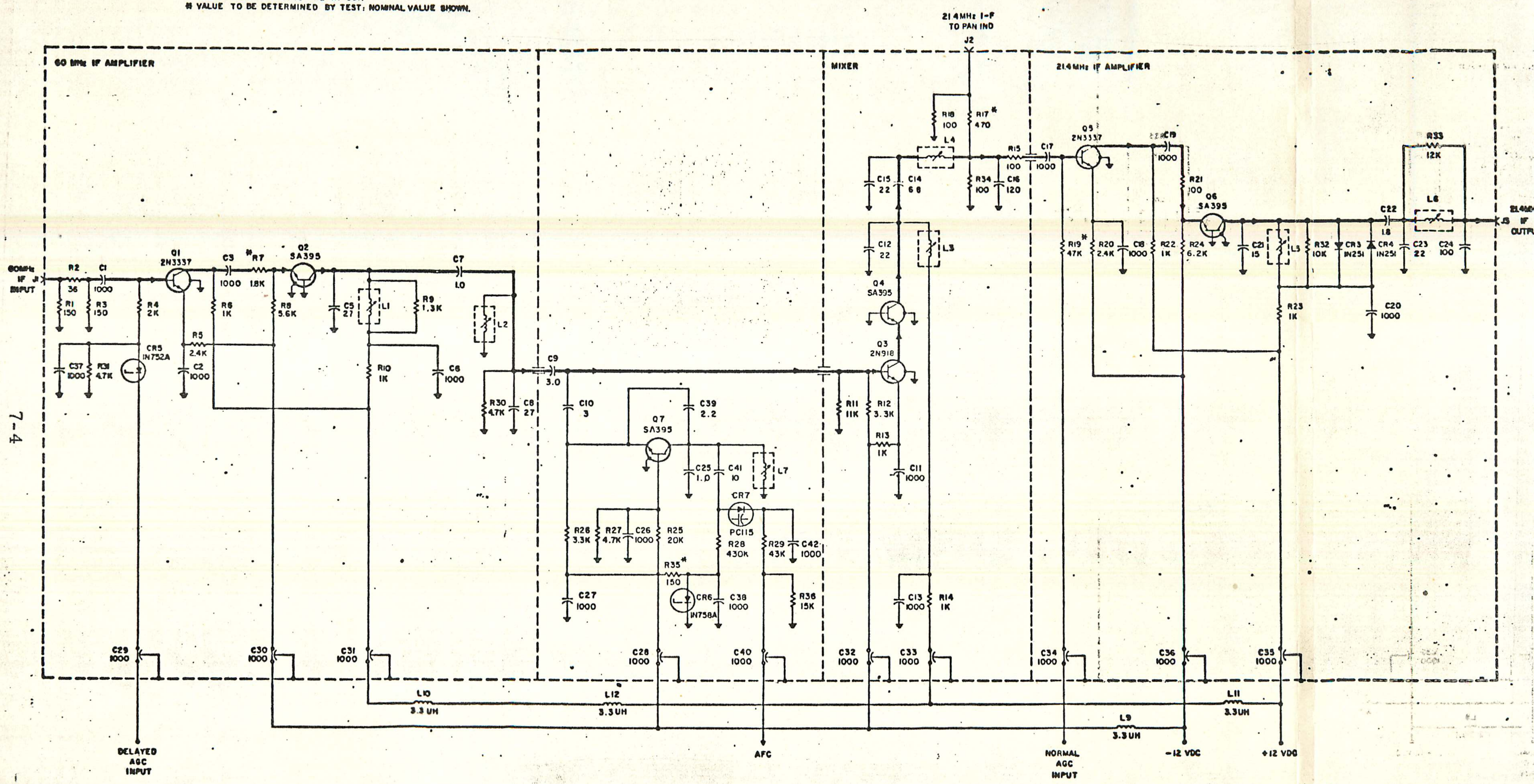

Figure 7-3. 60 to 21.4 MHz Converter, CV-204(AFC).